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(54) IMPROVEMENTS RELATING TO EXHAUST SYSTEMS FOR INTERNAL COMBUSTION ENGINES OF MOTOR BOATS OR AMPHIBIOUS VEHICLES

(71) I, ROBERT CECIL HOLT, a British subject, of 243 Romsey Road, Shirley, Southampton, Hampshire, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention relates to an exhaust system for internal combustion engines of motor boats and amphibious vehicles.

Particularly in motor boats, it is usual to vent exhaust fumes from an internal combustion engine thereof through an exhaust pipe, the outer end of which is below the water line of the boat. To avoid water being sucked back through the exhaust pipe when the engine stalls or is stopped it has been proposed to provide a loop in the exhaust pipe. Such loops in exhaust pipes are expensive to produce, use up a considerable amount of space in the boat, particularly since they are likely to get very hot and thus must be kept well clear of combustible materials, and have not proved to be satisfactory.

According to the invention, a motor boat or amphibious vehicle has an exhaust system for an internal combustion engine thereof, which includes a chamber, at least a part of which is above water level, having at an upper position therein an inlet port formed by the end of a pipe which enters the chamber at a lower position and passes upwardly within the chamber to terminate at an upper position within the chamber, through which inlet port exhaust gases from the engine can be passed into the chamber and at a lower position therein an outlet port connected to an exhaust pipe terminating below water level, through which outlet port exhaust gases can be vented to atmosphere, the capacity of at least that part of the chamber which is above water level being adapted to the engine capacity such that reverse rotation of the engine upon backfiring, stalling or stopping cannot cause water to be sucked through the exhaust system into the engine.

Advantageously the chamber is cylindrical with its axis substantially vertical.

The chamber may be provided with a jacket, through which jacket cooling water can flow. The cooling water is advantageously water which has been previously used to cool the engine and, after passing through the jacket, is fed into the exhaust system downstream of the chamber to be vented with the exhaust gases. In this way exhaust piping which is hot, and thus likely to be a fire risk in the engine compartment of the boat or amphibious vehicle, can be reduced to a relatively short length between the engine and the chamber, which length can be suitably lagged with heat insulating material if required.

The invention is diagrammatically illustrated by way of example in the accompanying drawings, in which:—

Figure 1 is a side view of part of an exhaust system of a motor boat or amphibious vehicle according to the invention;

Figure 2 is a sectional plan view taken on line II—II of Figure 1;

Figure 3 shows the disposition of the part of the exhaust system shown in Figures 1 and 2 with respect to the engine of a motor boat;

Figure 4 is a schematic side view of a further embodiment of part of an exhaust system of a motor boat or amphibious vehicle according to the invention, and

Figure 5 is a sectional plan view on line V—V of Figure 4.

Referring to Figures 1 to 3, a pipe 1, connected at its righthand end as shown in Figure 3 to an exhaust manifold 2 of an engine 3, enters a cylindrical chamber 4 through an aperture in the lower part of a wall 5 of the chamber and is welded to the wall 5 around the aperture at 6. A part 7 of the pipe 1 extends upwardly within the chamber 4 and the upper end of the portion

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7 of the pipe is open whereby it forms an inlet port through which exhaust gases from the engine 3 can pass into the chamber 4.

A pipe 8 has its righthand end, as shown in Figure 1, welded around the periphery of a further aperture in the lower part of the wall 5 of the chamber 4 at 9, the lefthand end of the pipe 8 extending, as shown in Figure 3, through the hull 10 of a motor boat, whereby exhaust gases passing through the pipe 8 can be vented into the water surrounding the boat and thus to atmosphere. The normal water level outside the boat is indicated at 11.

The pipe 8 includes a connection 12 through which cooling water from the engine 3 can be fed into the pipe 8 to pass outwardly therethrough together with the exhaust gases.

When the engine 3 is running, the pressure of the exhaust gases prevents the water surrounding the boat flowing into the pipe 8 and thus into the chamber 4. The chamber 4 is of a cubic capacity greater than the cubic capacity of any one of the cylinders of the engine 3, whereby if the engine 3 experiences reverse rotation by an amount of up to the rotation of the crank shaft of the engine between the ends of compression strokes of two cylinders which are adjacent in the firing order of the engine, the water can only flood into the chamber 4 but cannot spill into the pipe 7 to be sucked into the engine.

The chamber 4 is advantageously formed from a length of steel pipe about 4" in diameter and 10" long by cutting apertures in the walls thereof for connection of the pipe 8 and insertion of the pipe 1, the pipes 8 and 1 then being welded in place and end plates being welded over the ends of the pipe to form a closed chamber.

As shown in Figures 4 and 5, a pipe 101 coupled to the exhaust manifold of an engine passes through the wall 105 of a cylindrical container defining a chamber 104 and has a portion 107 which extends upwardly within the chamber 104. An exhaust pipe 108 leads from the lower end of the chamber 104. The chamber 104 can have a water jacket formed by a wall 113 spaced from the wall 105, the space between the walls 105 and 113 being fed with cooling water through an inlet connection 114. The cooling water fed through the inlet connection 114 passes outwardly from the jacket through a connection 115 and through a pipe 116 to a connection 112 whereby it is passed into the pipe 108; the pipe 116 and connections 115 and 112 are of a greater diameter than the connection 114. Of the exposed pipes only the pipe 101 is hot and thus the fire risk in the engine compartment of the boat is considerably reduced.

WHAT I CLAIM IS:—

1. A motor boat or amphibious vehicle having an exhaust system for an internal combustion engine thereof, which includes a chamber, at least a part of which is above water level, having at an upper position therein an inlet port formed by the end of a pipe which enters the chamber at a lower position and passes upwardly within the chamber to terminate at an upper position within the chamber, through which inlet port exhaust gases from the engine can be passed into the chamber and at a lower position therein an outlet port connected to an exhaust pipe terminating below water level, through which outlet port exhaust gases can be vented to atmosphere, the capacity of at least that part of the chamber which is above water level being adapted to the engine capacity such that reverse rotation of the engine upon backfiring, stalling or stopping cannot cause water to be sucked through the exhaust system into the engine.

2. A boat or amphibious vehicle having an exhaust system for an internal combustion engine thereof according to claim 1, in which the chamber is cylindrical with its axis substantially vertical.

3. A boat or amphibious vehicle having an exhaust system for an internal combustion engine thereof according to claim 1 or claim 2, in which the chamber is provided with a jacket through which cooling water can flow.

4. A boat or amphibious vehicle having an exhaust system for an internal combustion engine thereof, according to claim 3, in which said exhaust pipe includes a connection through which cooling water from said jacket which cooling water has been previously used to cool the engine, can be fed to be vented with the exhaust gases.

5. A boat or amphibious vehicle having an exhaust system for an internal combustion engine thereof substantially as hereinbefore described and illustrated with reference to Figures 1 to 3 or Figures 4 and 5 of the accompanying drawings.

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FIG.1.

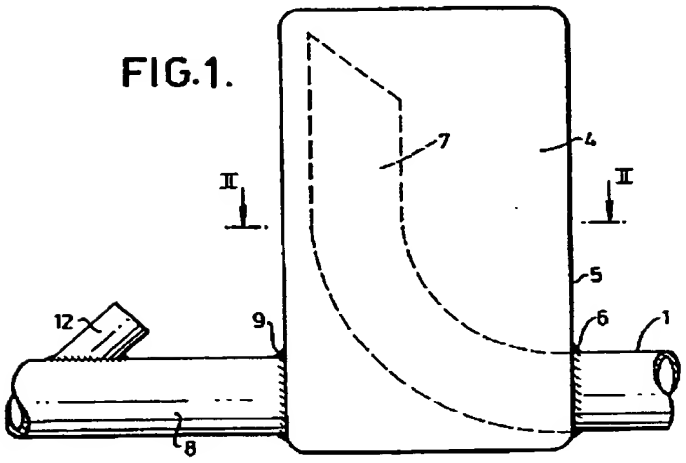


FIG. 2.

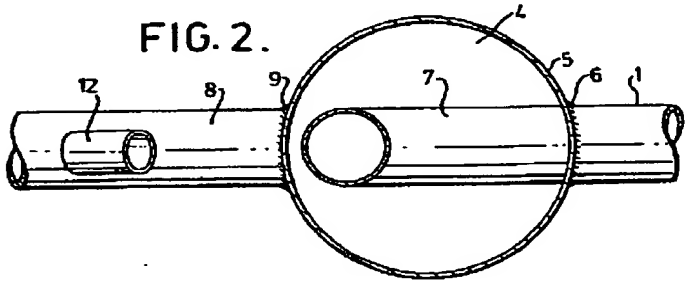
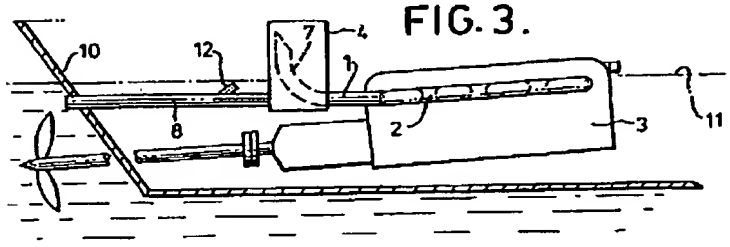


FIG. 3.



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Sheet 2

FIG. 4.

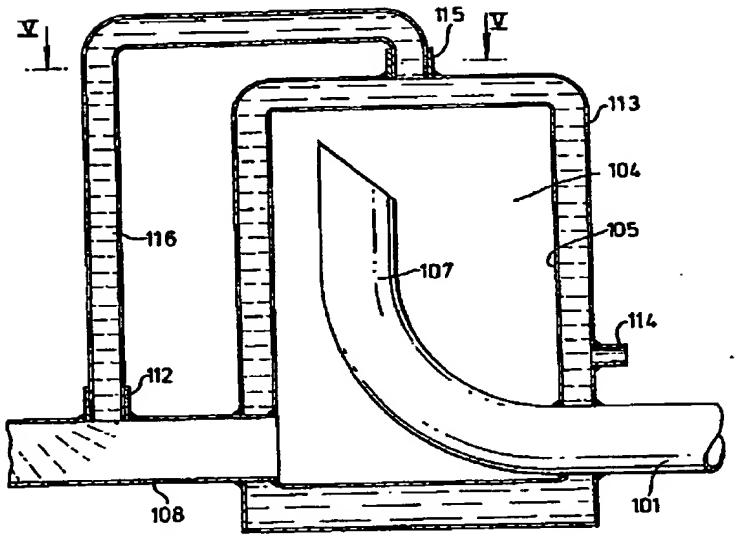

FIG. 5.